In [104]:
```
%matplotlib inline

import numpy as np
import pandas as pd
import matplotlib as mpl
import matplotlib.pyplot as plt
```

In [105]:
```
data = pd.read_fwf("auto-mpg.data", na_values='?')
```

In [106]:
```
['mpg', 'cylinders', 'displacement', 'horsepower', 'weight', 'acceleration'
```

In [107]:
```
data.set_index('car name')
```

Out[107]:

car name	mpg	cylinders	displacement	horsepower	weight	acceleration	model year	origin
"buick skylark 320"	15.0	8	350.0	165.0	3693.0	11.5	70	1
"plymouth satellite"	18.0	8	318.0	150.0	3436.0	11.0	70	1
"amc rebel sst"	16.0	8	304.0	150.0	3433.0	12.0	70	1
"ford torino"	17.0	8	302.0	140.0	3449.0	10.5	70	1
"ford galaxie 500"	15.0	8	429.0	198.0	4341.0	10.0	70	1
...	...	...	...	...	...	...	...	...
"ford mustang gl"	27.0	4	140.0	86.0	2790.0	15.6	82	1
"vw pickup"	44.0	4	97.0	52.0	2130.0	24.6	82	2
"dodge rampage"	32.0	4	135.0	84.0	2295.0	11.6	82	1
"ford ranger"	28.0	4	120.0	79.0	2625.0	18.6	82	1
"chevy s-10"	31.0	4	119.0	82.0	2720.0	19.4	82	1

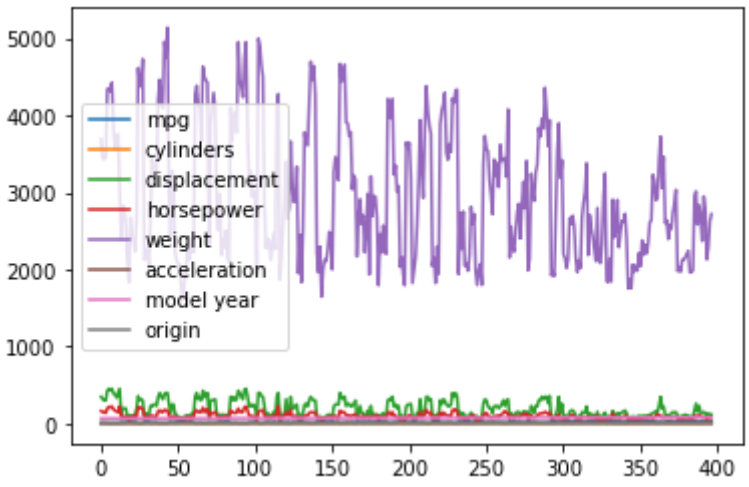
397 rows × 8 columns

In [108]:
```
print(data.head(5))
```

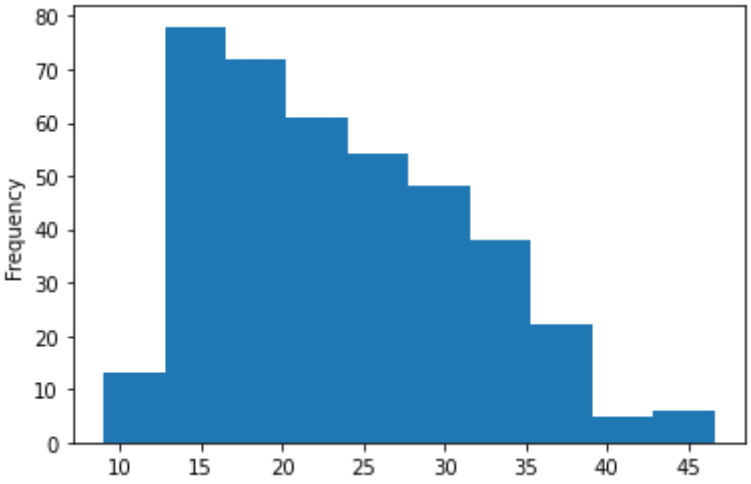
```
    mpg  cylinders  displacement  horsepower  weight  acceleration  \
0  15.0          8         350.0       165.0  3693.0          11.5
1  18.0          8         318.0       150.0  3436.0          11.0
2  16.0          8         304.0       150.0  3433.0          12.0
3  17.0          8         302.0       140.0  3449.0          10.5
4  15.0          8         429.0       198.0  4341.0          10.0

   model year  origin                car name
0          70       1   "buick skylark 320"
1          70       1  "plymouth satellite"
2          70       1       "amc rebel sst"
3          70       1         "ford torino"
4          70       1    "ford galaxie 500"
```

In [109]:
```
data.plot()
```

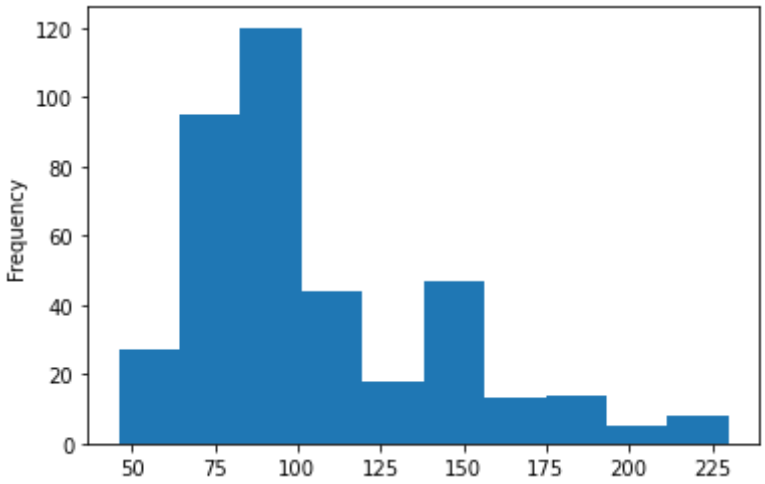
Out[109]: <AxesSubplot:>



In [110]:
```
data['mpg'].plot.hist();
```



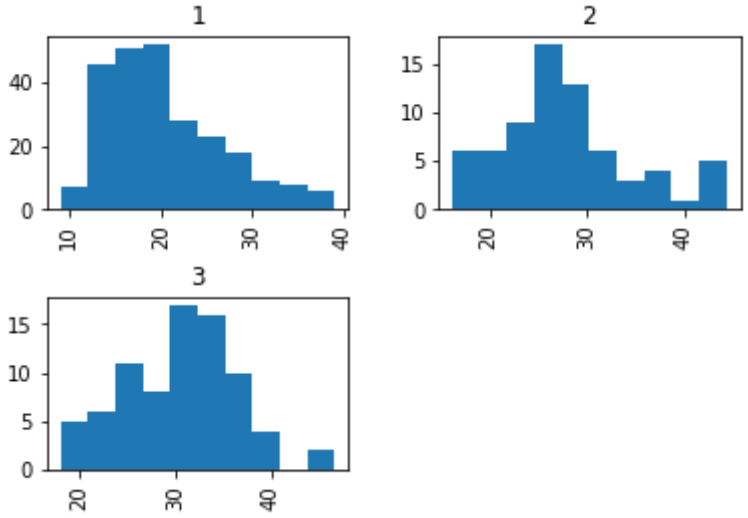
In [115]:
```
data['horsepower'].plot.hist();
```



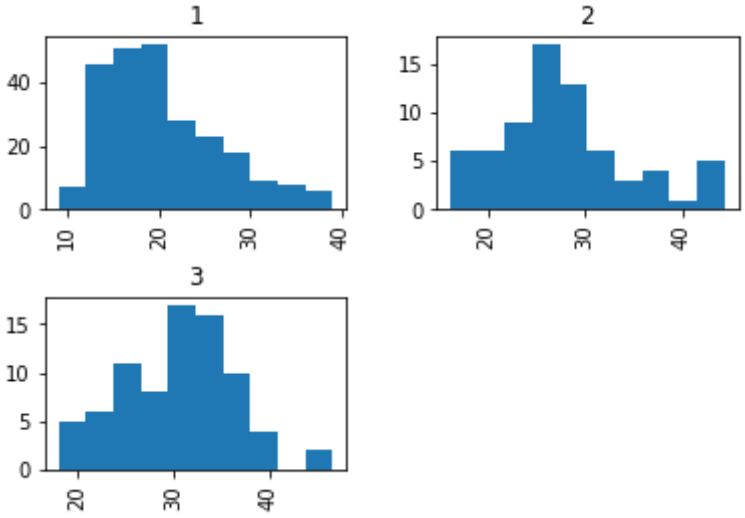
In [119]:
```
data.origin.value_counts()
```

Out[119]:
```
1    248
3     79
2     70
Name: origin, dtype: int64
```

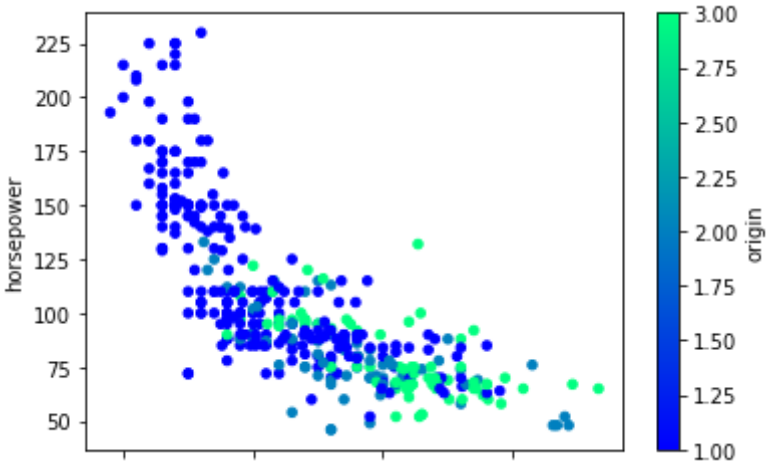
In [120]:
```
axs = data.hist(column='mpg', by='origin')
```



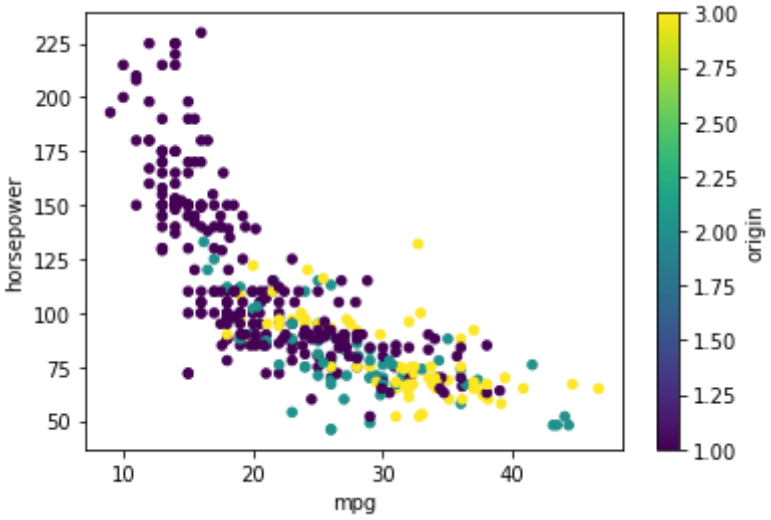
In [141]:
```
axs = data.hist(column='mpg', by='origin')
# axs[1].set(title='female', ylim=[0, 45])
# axs[2].set(title='male', ylim=[0, 45])
# axs[3].set(title='water', ylim=[0,45]);
```



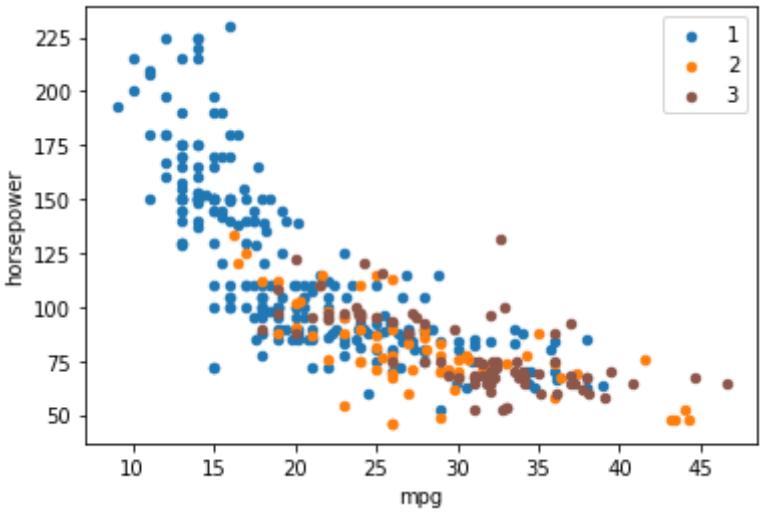
In [134]:
```
data.plot.scatter('mpg', 'horsepower', c='origin', colormap='winter');
```



In [132]:
```
fig, ax = plt.subplots()
data.plot.scatter('mpg', 'horsepower', c='origin', colormap='viridis', ax=a
```

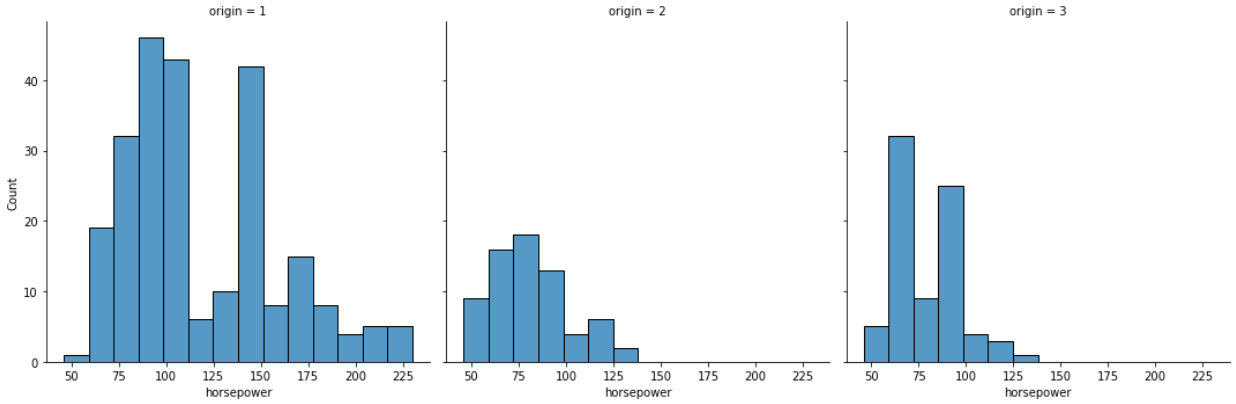


In [68]:
```
colors = {1: 'tab:blue', 2: 'tab:orange', 3: 'tab:brown'}
fig, ax = plt.subplots()
for key, group in data.groupby(by='origin'):
    group.plot.scatter('mpg', 'horsepower', c=colors[key], label=key, ax=ax
```

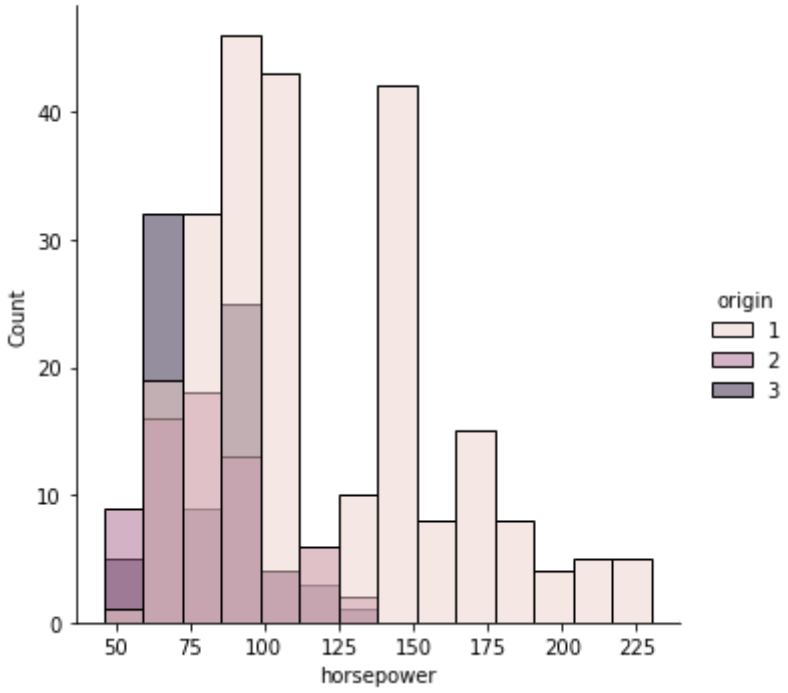


In [69]:
```
import seaborn as sns
```

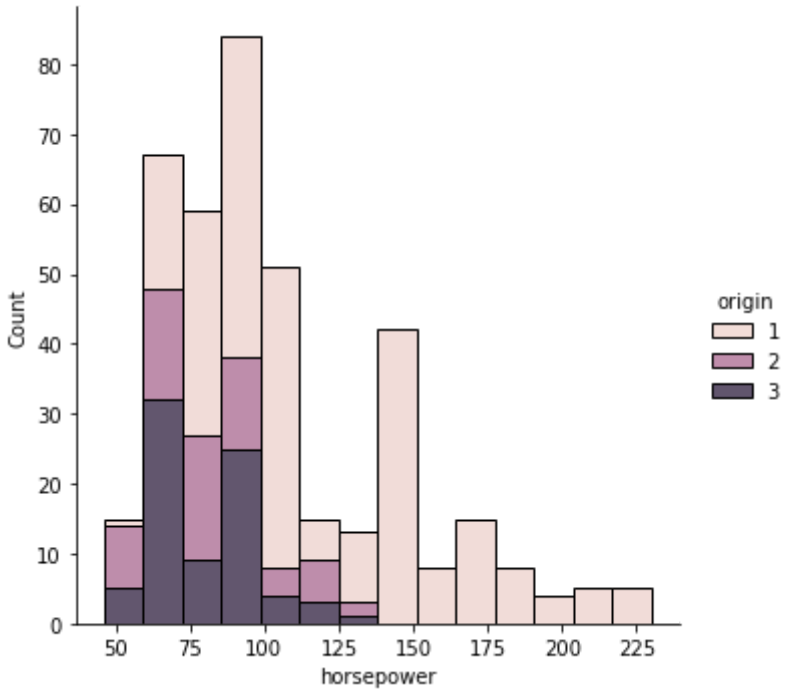
In [70]:
```
sns.displot(x='horsepower', col='origin', data=data);
```



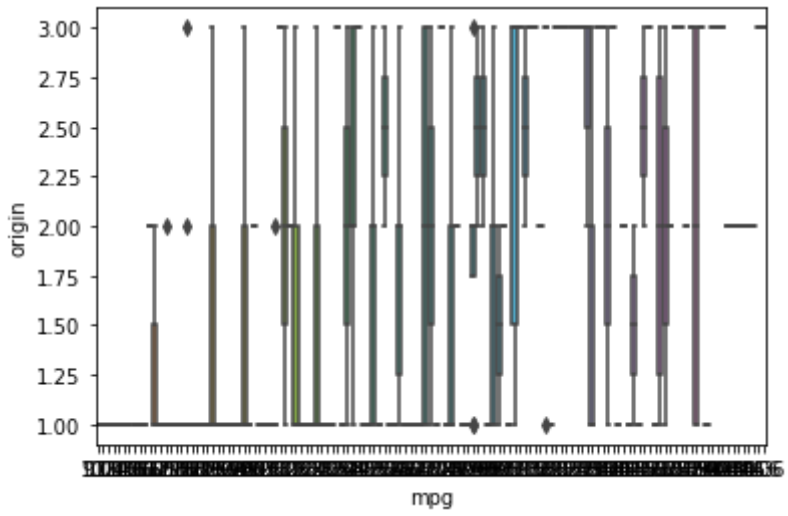
In [71]:
```
sns.displot(x='horsepower', hue='origin', data=data);
```



In [72]:
```
sns.displot(x='horsepower', hue='origin', data=data, multiple='stack');
```



In [74]:
```
sns.boxplot(x='mpg', y='origin', data=data);
```



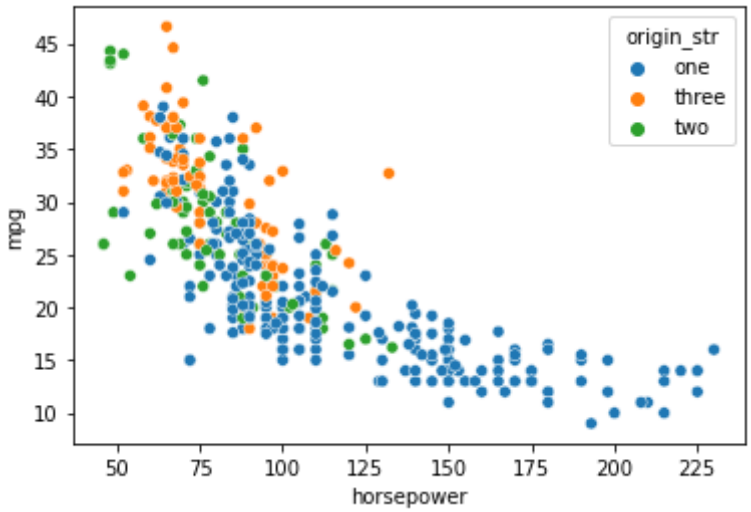
In [87]:
```
data['origin_str'] = data['origin'].replace([1,2,3], ['one', 'two', 'three'
data
```

Out[87]:

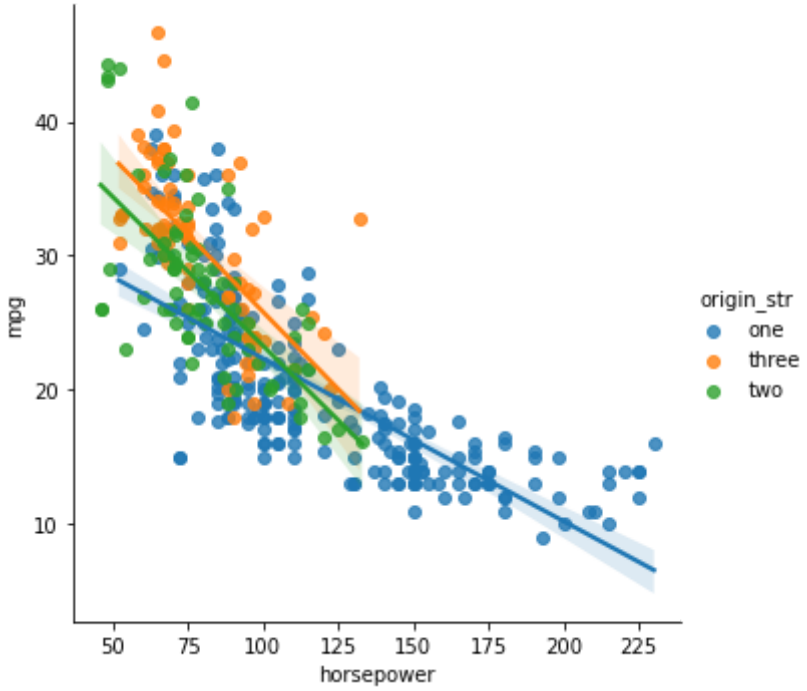
	mpg	cylinders	displacement	horsepower	weight	acceleration	model year	origin	car name	ori
0	15.0	8	350.0	165.0	3693.0	11.5	70	one	"buick skylark 320"	
1	18.0	8	318.0	150.0	3436.0	11.0	70	one	"plymouth satellite"	
2	16.0	8	304.0	150.0	3433.0	12.0	70	one	"amc rebel sst"	
3	17.0	8	302.0	140.0	3449.0	10.5	70	one	"ford torino"	
4	15.0	8	429.0	198.0	4341.0	10.0	70	one	"ford galaxie 500"	
...	...	...	...	...	...	...	...	...	...	
392	27.0	4	140.0	86.0	2790.0	15.6	82	one	"ford mustang gl"	
393	44.0	4	97.0	52.0	2130.0	24.6	82	two	"vw pickup"	
394	32.0	4	135.0	84.0	2295.0	11.6	82	one	"dodge rampage"	
395	28.0	4	120.0	79.0	2625.0	18.6	82	one	"ford ranger"	
396	31.0	4	119.0	82.0	2720.0	19.4	82	one	"chevy s-10"	

397 rows × 10 columns

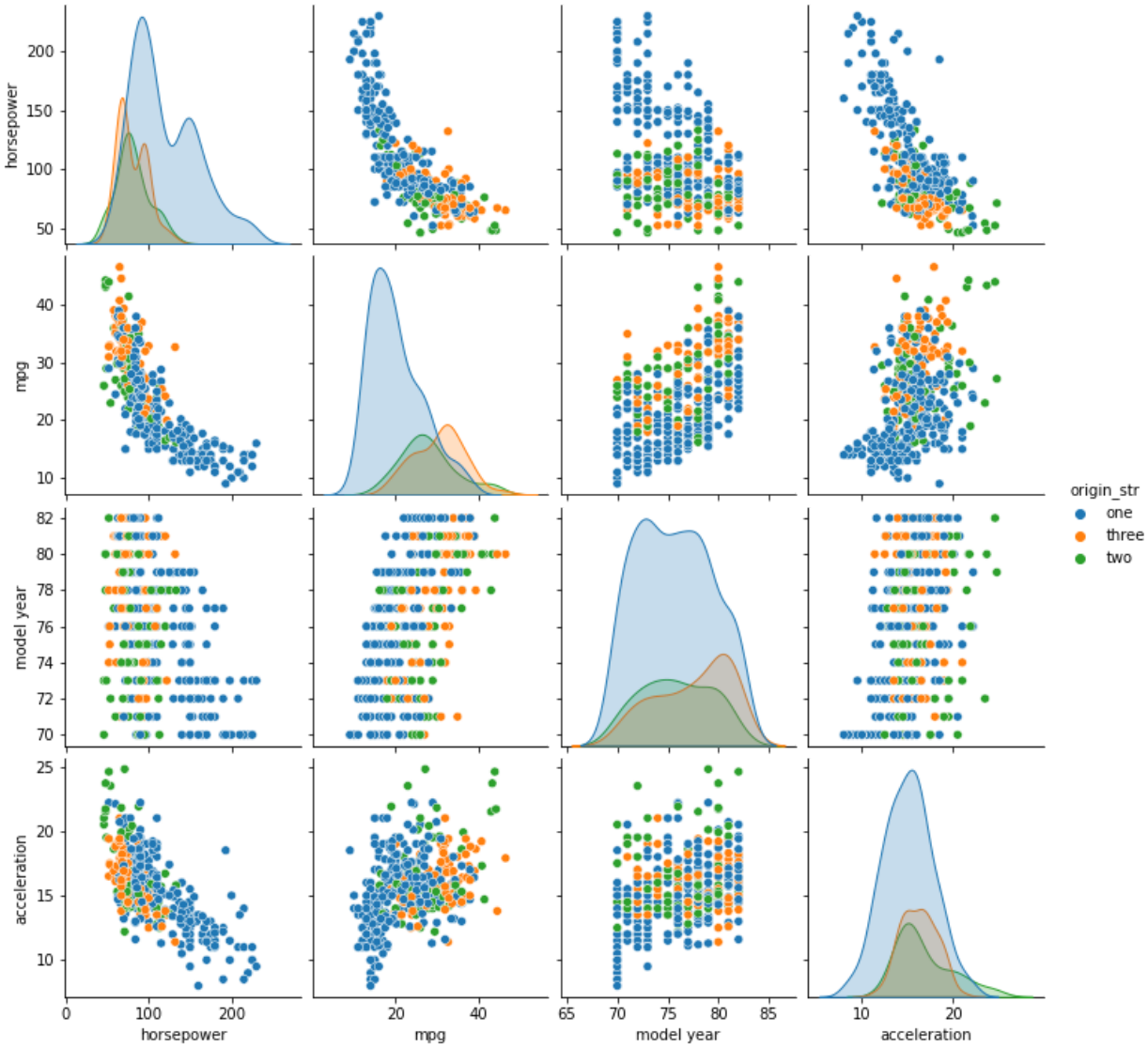
In [88]:
```
ax = sns.scatterplot(x='horsepower', y='mpg', data=data, hue='origin_str')
```



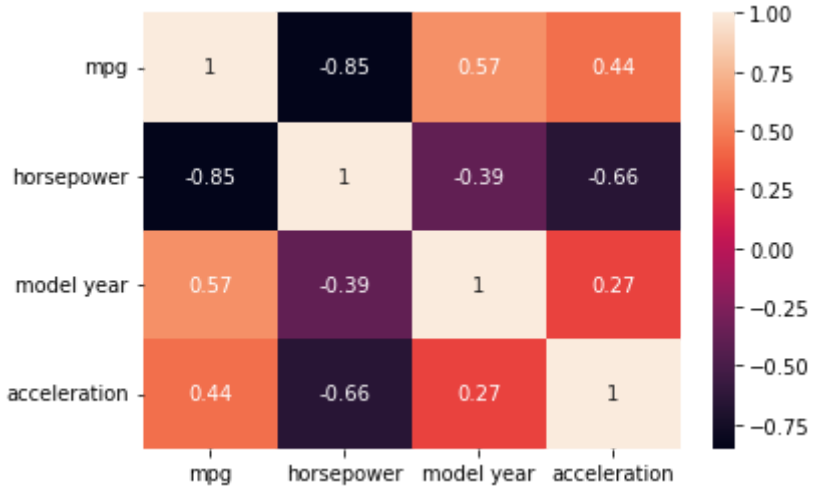
In [89]:
```
ax = sns.lmplot(x='horsepower', y='mpg', data=data, hue='origin_str')
```



In [90]:
```
sns.pairplot(data, vars=['horsepower', 'mpg', 'model year', 'acceleration']
```



In [91]:
```
g = sns.heatmap(data[['mpg', 'horsepower', 'model year', 'acceleration']].c
                annot=True)
```



In [ ]: